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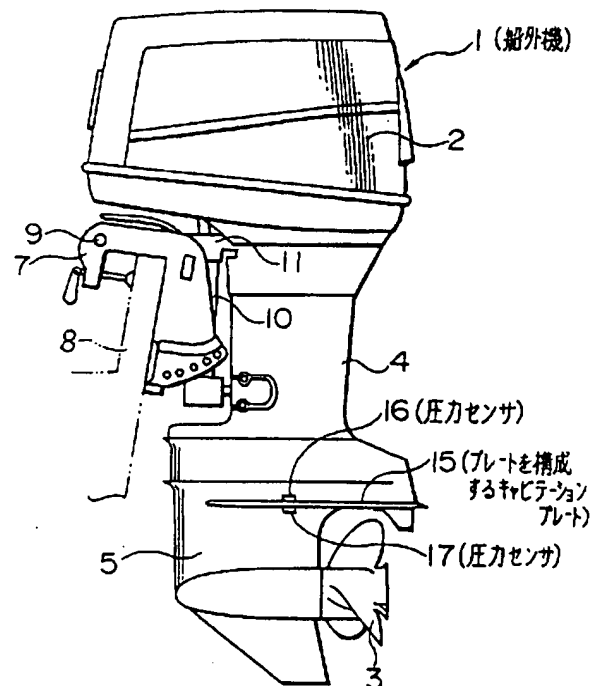
(71)出願人 000002082
スズキ株式会社
静岡県浜松市高塚町300番地
(72)発明者 磯部 聡
静岡県浜松市高塚町300番地 スズキ株式
会社内
(74)代理人 弁理士 高橋 勇

(54)【発明の名称】 船外機の姿勢制御装置

(57)【要約】

【目的】 船舶の推進状況に応じて生ずる船外機の姿勢変位を自動的に最適状態に復帰させる制御装置の提供。

【構成】 船外機1のキャビテーションプレート15の上下相対位置に圧力センサ16、17を設けるとともに、これらセンサ16、17に与えられる圧力差ないし電圧差等を基準にして船外機の姿勢変位を検出する制御装置18を設ける。この制御装置18の制御信号はP T T装置(パワートリム・チルト装置)19に与えられるように構成され、当該P T T装置は制御信号に従ってP T T装置を構成する油圧モータを駆動する。



【特許請求の範囲】

【請求項1】 船外機の下部水平方向に延出するプレート上面側及び下面側に相対配置された一対の圧力センサと、これら圧力センサに与えられる圧力差に基づいて船外機の姿勢変位を検出する機能及び当該検出結果に基づいてPTT装置作動信号を出力する機能を有する制御装置とを備えたことを特徴とする船外機の姿勢制御装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は船外機の姿勢制御装置に係り、更に詳しくは、船外機のトリム角、チルト角を可変とする姿勢制御装置に関する。

【0002】

【従来の技術】一般に、小型船舶においては、速度性能や燃費向上を図るために、船外機のトリム角等を制御することが行なわれている。

【0003】前記トリム角等の制御は、船外機のクランプブラケットとスイベルブラケットとの間に装備されたパワートリム・チルト装置（PTT装置）を駆動させることによって行われており、操縦者が手動によりPTT装置のモータを駆動させるべく所定のスイッチ操作を行うものが多い。

【0004】

【発明が解決するための課題】前記PTT装置による船外機の姿勢制御は、操縦者の手動スイッチ操作により所定のトリム角を維持すべく動作を得、これによって船舶の速度性能を最大限に発揮させ得るが、前記スイッチ操作は操縦者の経験的な勘に依存していることから、操縦者のいかんによってトリム角制御がまちまちとなり、ひいては期待されるエンジン性能を有効に発揮できないばかりか、燃費上昇をも招来するという不都合があった。

【0005】

【発明の目的】本発明は、前記従来例の不都合に鑑みてなされたもので、その目的は、船舶の推進時における船外機の姿勢変位を逐次検出することができ、この検出結果に基づいて船外機の姿勢を所定位置に自動的に変位させることが可能な船外機の姿勢制御装置を提供することにある。

【0006】

【課題を解決するための手段】前記目的を達成するため、本発明に係る船外機の姿勢制御装置は、船外機の下部水平方向に延出するプレート上面側及び下面側に相対配置された一対の圧力センサと、これら圧力センサに与えられる圧力差に基づいて船外機の姿勢変位を検出する機能及び当該検出結果に基づいてPTT装置作動信号を出力する機能を有する制御装置とを備えた構成となっている。

【0007】

【作用】前記プレートは水平方向に延出しているため、船外機が略垂直位置にある状態で船舶が推進していると

きには、各圧力センサに与えられる水圧は等しいが、加速時あるいは減速時等には船舶全体が水面に対して傾斜することに対応して前記プレートも傾斜する。かかる傾斜時における各圧力センサに加えられる水圧は相対的に変化するため、この変化に応じて制御装置は各圧力センサの検出圧力が等しくなるようPTT作動信号を出力することとなる。

【0008】

【発明の実施例】以下、本発明の一実施例を図面に基づいて説明する。

【0009】図1には船外機1の全体構成が示されている。この図において、船外機1は図示しないエンジンを収容する上部ユニット2と、前記エンジンの駆動力をスクリュウ3に伝達する駆動軸を収容するケース4と、このケース4の下部に設けられるとともに前記スクリュウ3を回転自在に支持する下部ユニット5を含み構成されている。

【0010】前記船外機1はクランプブラケット7を介して船尾8に連結固定されるようになっており、このクランプブラケット7の上端に設けられた支持軸9を回動支点としてスイベルブラケット10が回動自在に連結され、このスイベルブラケット10には、前記ユニット2側に連結されたステアリングブラケット11が図示しないパイロットピンを介して船外機1を水平方向に旋回可能となるよう設けられている。また、前記クランプブラケット7とスイベルブラケット10との間には、図示しない既知のPTT装置が設けられており、これにより、船外機1のトリム角及びチルト角制御が行われるようになっている。

【0011】前記下部ユニット5の外周面には、水平方向に向けてフランジ状をなすプレートであるキャビテーションプレート15が設けられている。なお、図示の状態では説明の便宜上比較的肉厚に示しているが、実機においては肉薄に設けられている。このキャビテーションプレート15の上面側と下面側とは、圧力センサ16、17が相対配置され、これら圧力センサ16、17に与えられる圧力差によりトリム角制御が行われるようになっている。

【0012】すなわち、図2に示されるようなブリッジ回路を設けて一定の電圧をかける構成とし、A、B間の電圧差を捉えて船外機1の姿勢変位を制御装置18により検出し、この検出結果に基づいて次段のPTT装置19に作動信号を出力する構成となっている。制御装置18には回転計20及びスロットル開度測定器21からの出力が入力されるようになっており、これら計器20、21から与えられる検出値によっても船外機1の姿勢制御が行われるようになっている。

【0013】次に、本実施例の作用につき、図3、4をも参照して説明する。

【0014】図1に示されるように船外機1が略垂直状

態にあるときには、キャビテーションプレート15は水平に維持されているため、図2に示されるA、B両地点における電圧差は一定であるが、図3に示されるようにキャビテーションプレート15の前端側が下方へ変位するように船外機1が傾斜すると、当該キャビテーションプレート15の上面側に設けられた圧力センサ16に加えられる圧力は、下面側の圧力センサ17に相対して高くなる。この時、前記電圧差に変化を生じ、これを検知して制御装置18はPTT作動信号を出力する。

【0015】この一方、図4に示されるように、前述とは反対方向へキャビテーションプレート15が傾斜すると、下面側の圧力センサ17に加えられる圧力が相対的に高くなり、前述と同様にしてPTT作動信号が制御装置18より出力されることとなる。

【0016】前記PTT作動信号がPTT装置19に与えられると、当該PTT装置19の一部を構成する図示しないモータが駆動され、トリムシリンダ、チルトシリンダが駆動されて当該シリンダ内にて進退可能に設けられたピストンロッドがスイベルブラケット10を所定変位させ、これによって船外機1の姿勢制御がなされることとなる。

【0017】従って、本発明の前記構成によれば、圧力センサ16、17を用い、これら各センサ16、17に加わる水圧変化を検知することによってトリム角変位を捕捉し、これに対応してPTT装置19を自動的に駆動させる構成としたから、従来の如く操縦者の勘に依存することが全くなく、常に安定姿勢に船外機1を維持することが達成でき、期待されるエンジン性能を効率よく発揮させることと相俟って燃費節約をも実現するという効果がある。

【0018】また、前記トリム角変位検出は既知の圧力センサ16、17を利用できることに加え、これの設置箇所も既存船外機におけるキャビテーションプレート15としたから、従来構造に大きな設計変更をもたらすことなく適用できるという効果がある。

【0019】なお、前記実施例においては、圧力センサ16、17はキャビテーションプレート15の上面側と下面側とに露出して設置する構成例について図示、説明したが、本発明はこれに限定されるものではない。例えば図5に示されるように、キャビテーションプレート15内の上下相対位置に圧力センサ16、17を埋設する

とともに、これら圧力センサ16、17に通じる孔23、24を設けて水圧検出を可能とした構成であってもよい。

【0020】このような構成によれば、前記実施例における効果に加え、水中における障害物との直接的な接触を回避可能となり、圧力センサ16、17を損傷から有効に保護できるという利点を得ることが期待される。

【0021】また、前記実施例では電圧差によって船外機の姿勢変位を検出するものとしたが、例えば圧力センサ16、17から制御装置18に圧力値を連続的に取込むとともに、両圧力値を当該制御装置18にて比較して差を求め、この差がゼロになるまでPTT装置を作動させるよう構成することも可能であり、これによれば回路構造の簡略化が実現できるという効果を得ることができる。

【0022】さらに、圧力センサ16、17の設置箇所はキャビテーションプレート15以外のプレート上に設定することも可能である。

【0023】

【発明の効果】本発明は以上のように構成され、かつ、作用するので、これによると船外機の従来構造を利用した簡易な構成によって、船舶の推進時における船外機の姿勢変位を逐次検出することができ、この検出結果に基づいて船外機の姿勢を所定位置に自動的に変位させることができるという従来にない優れた効果を奏する船外機の姿勢制御装置を提供することができる。

【図面の簡単な説明】

【図1】本発明に係る船外機の姿勢制御装置の一実施例を示す船外機の外観構成図である。

【図2】前記実施例における回路構成図である。

【図3】

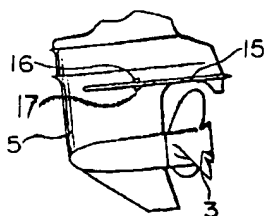
【図4】前記実施例における作用を説明するための図である。

【図5】前記実施例における圧力センサの異なる設置例を示す説明図である。

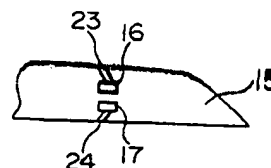
【符号の説明】

- 1 船外機
- 15 プレートを構成するキャビテーションプレート
- 16、17 圧力センサ
- 18 制御装置
- 19 PTT装置

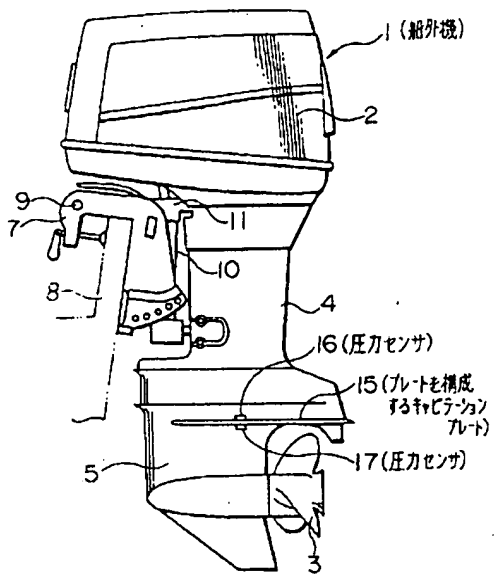
【図3】



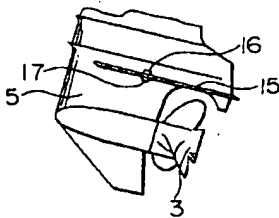
【図5】



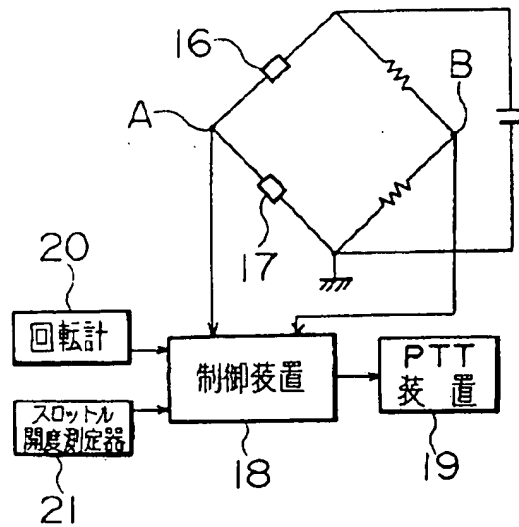
【図1】



【図4】



【図2】



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SUZUKI MOTOR CORP

(22)Date of filing : 26.12.1991

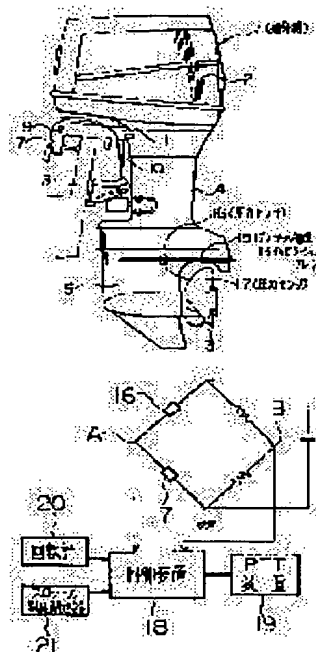
(72)Inventor : ISOBE SATOSHI

(54) ATTITUDE CONTROLLER OF OUTBOARD ENGINE

(57)Abstract:

PURPOSE: To provide a controller for automatically returning the attitude displacement of an outboard engine, generated according to the propulsion situation of a ship to the optimum state.

CONSTITUTION: Pressure sensors 16, 17 are provided in the upper and lower, opposite positions of the cavitation plate 15 of an outboard engine 1, and a controller 18 for detecting the attitude displacement of an outboard engine on the basis of differential pressure and/or differential voltage applied to these sensors 16, 17 is provided. The control signal of the controller 18 is transmitted to a PTT device (power-trim tilt device), and the PTT device drives a hydraulic motor for constituting the PTT device according to the control signal.



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[Date of final disposal for application]

[Patent number]

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[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] a pressure differential given to a pressure sensor and these pressure sensor of a couple by which the relative configuration was carried out to a plate upper surface [which extends in the direction of bottom horizontal discharge of an outboard motor], and underside side — being based — the position of an outboard motor — the attitude-control equipment of the outboard motor characterized by to have a control unit which has a function which outputs an PTT equipment active signal based on a function detect a variation rate, and the detection result concerned.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the attitude control equipment of an outboard motor, and relates to the attitude control equipment which makes adjustable the angle of trim of an outboard motor, and a tilt angle in more detail.

[0002]

[Description of the Prior Art] Generally, in order to aim at the speed engine performance and improvement in fuel consumption in a small marine vessel, controlling the angle of trim of an outboard motor etc. is performed.

[0003] There is much what performs predetermined switch actuation so that control of said angle of trim etc. may be performed by making the power trim tilt equipment (PTT equipment) equipped between the clamp bracket of an outboard motor, and the swivel bracket drive and a pilot may make the motor of PTT equipment drive with hand control.

[0004]

[A technical problem to solve invention] Although the attitude control of the outboard motor by said PTT equipment obtains actuation that a predetermined angle of trim should be maintained by manual switch actuation of a pilot and may demonstrate the speed engine performance of a marine vessel by this to the maximum extent Since it was dependent on a pilot's experiential intuition, said switch actuation had the inconvenience of also inviting about [that the engine performance which angle-of-trim control becomes various by a pilot's situation, as a result is expected cannot be demonstrated effectively], and fuel consumption lifting.

[0005]

[Objects of the Invention] the position of the outboard motor [this invention was made in view of the inconvenience of said conventional example, and / object / that] at the time of propulsion of a marine vessel — a variation rate can be detected serially and it is in offering the attitude control equipment of an outboard motor with possible making a predetermined location carry out the variation rate of the position of an outboard motor automatically based on this detection result.

[0006]

[Means for Solving the Problem] the pressure differential given to the pressure sensor and these pressure sensor of the couple by which a relative configuration was carried out to a plate upper surface [where attitude-control equipment of an outboard motor concerning this invention extends in the direction of bottom horizontal discharge of an outboard motor in order to attain said object], and underside side — being based — the position of an outboard motor — it has the composition equipped with the control unit which has the function which outputs an PTT equipment active signal based on the function detect a variation rate, and the detection result concerned.

[0007]

[Function] Although the water pressure given to each pressure sensor is equal while the marine vessel is promoting in the condition that an outboard motor is in an abbreviation vertical position since said plate has extended horizontally, at the time of acceleration or a slowdown, said plate

also inclines corresponding to the whole marine vessel inclining to the water surface. Since the water pressure applied to each pressure sensor at the time of this dip changes relatively, according to this change, a control unit will output an PTT active signal so that the detection pressure of each pressure sensor may become equal.

[0008]

[Example] Hereafter, one example of this invention is explained based on a drawing.

[0009] The whole outboard motor 1 configuration is shown in drawing 1. In this drawing, the outboard motor 1 is constituted including the lower unit 5 supported for said screw 3, enabling a free revolution while being prepared in the lower part of the up unit 2 which holds the engine which is not illustrated, the case 4 where the driving shaft which transmits the driving force of said engine to a screw 3 is held, and this case 4.

[0010] Through the clamp bracket 7, by using as the rotation supporting point the support shaft 9 which connection immobilization was carried out and was prepared in the upper bed of this clamp bracket 7 at the stern 8, a swivel bracket 10 is connected free [rotation], and said outboard motor 1 is formed so that turning may become horizontally possible about an outboard motor 1 through the pilot pin which the steering bracket 11 connected at said unit 2 side does not illustrate to this swivel bracket 10. Moreover, the known PTT equipment which is not illustrated is formed between said clamp brackets 7 and swivel brackets 10, and, thereby, the angle of trim of an outboard motor 1 and tilt angle control are performed.

[0011] The cavitation plate 15 which is a plate which turns horizontally and makes the shape of a flange is formed in the peripheral face of said lower unit 5. In addition, although comparatively shown in thickness after [expedient] explaining in the state of a graphic display, in the system, it is prepared in closing in. The relative configuration of the pressure sensors 16 and 17 is carried out, and angle-of-trim control is performed in an upper surface [of this cavitation plate 15], and underside side by the pressure differential given to these pressure sensors 16 and 17.

[0012] namely, — the configuration to which prepares a bridge circuit as shown in drawing 2, and fixed voltage is applied — carrying out — the voltage difference between A and B — catching — the position of an outboard motor 1 — a control unit 18 detects a variation rate and it has composition which outputs an active signal to the PTT equipment 19 of the next step based on this detection result. Attitude control of an outboard motor 1 is performed by the detection value which the output from a tachometer 20 and the throttle opening measuring instrument 21 is inputted into a control unit 18, and is given from these meters 20 and 21.

[0013] Next, also with reference to drawing 3 and 4, it explains about an operation of this example.

[0014] Although the voltage difference in A and the B car point which are shown in drawing 2 is fixed since the cavitation plate 15 is maintained horizontally when an outboard motor 1 is in an abbreviation vertical condition, as shown in drawing 1 If an outboard motor 1 inclines so that the front end side of the cavitation plate 15 may displace below as shown in drawing 3, the pressure applied to the pressure sensor 16 formed in the upper surface side of the cavitation plate 15 concerned will face the pressure sensor 17 by the side of an underside, and will become high. At this time, change is produced to said voltage difference, this is detected, and a control unit 18 outputs an PTT active signal.

[0015] On the other hand, as shown in drawing 4, when the cavitation plate 15 inclines toward an opposite direction, this pressure applied to the pressure sensor 17 by the side of an underside becomes high relatively, and an PTT active signal will be outputted from a control unit 18 like the above-mentioned with the above-mentioned.

[0016] When said PTT active signal is given to PTT equipment 19, the piston rod which the motor which constitutes some of PTT equipments 19 concerned, and which is not illustrated drove, and the trim cylinder and the tilt cylinder drove, and was formed possible [an attitude] within the cylinder concerned will carry out the predetermined variation rate of the swivel bracket 10, and the attitude control of an outboard motor 1 will be made by this.

[0017] Therefore, according to said configuration of this invention, pressure sensors 16 and 17 are used. A trim angular displacement is caught by detecting water pressure change which joins each [these] sensors 16 and 17. Since it considered as the configuration which makes PTT

equipment 19 drive automatically corresponding to this. Like the former, it is not dependent on a pilot's intuition, can attain always maintaining an outboard motor 1 into a stable position, and is effective in the ability to also realize fuel consumption economization as demonstrating the engine performance expected efficiently and ****.

[0018] Moreover, since said angle-of-trim displacement detection also used the installation part of this as the cavitation plate 15 in the existing outboard motor in addition to the ability to use the known pressure sensors 16 and 17, it is effective in the ability to apply without bringing a big design change conventionally to structure.

[0019] In addition, in said example, although pressure sensors 16 and 17 were illustrated and explained about the example of a configuration exposed and installed in an upper surface [of the cavitation plate 15], and underside side, this invention is not limited to this. For example, as shown in drawing 5 , while laying pressure sensors 16 and 17 under the vertical relative position in the cavitation plate 15, you may be the configuration which formed the holes 23 and 24 which lead to these pressure sensors 16 and 17, and enabled water pressure detection.

[0020] According to such a configuration, in addition to the effect in said example, it becomes avoidable [direct contact with an underwater obstruction], and acquiring the advantage that pressure sensors 16 and 17 can be effectively protected from breakage is expected.

[0021] moreover — said example — a voltage difference — the position of an outboard motor — although a variation rate shall be detected, while incorporating a pressure value, for example from pressure sensors 16 and 17 continuously to a control unit 18, constituting so that PTT equipment may be operated is also possible, and according to this, the effect that simplification of circuit structure is realizable can be acquired until the control unit 18 concerned compares both the pressure value, it searches for a difference and this difference becomes zero.

[0022] Furthermore, the installation part of pressure sensors 16 and 17 can also be set up on plates other than cavitation plate 15.

[0023]

[Effect of the Invention] the position of the outboard motor [configuration / which used the conventional structure of an outboard motor according to this since this invention was constituted as mentioned above and acted / simple] at the time of propulsion of a marine vessel — a variation rate can detect serially and the attitude-control equipment of the outboard motor which does so the outstanding effect it is ineffective to the former of the ability to be able to make a predetermined location carry out the variation rate of the position of an outboard motor automatically based on this detection result can offer.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the appearance block diagram of the outboard motor in which one example of the attitude control equipment of the outboard motor concerning this invention is shown.

[Drawing 2] It is circuitry drawing in said example.

[Drawing 3]

[Drawing 4] It is drawing for explaining the operation in said example.

[Drawing 5] It is explanatory drawing showing the example of installation from which the pressure sensor in said example differs.

[Description of Notations]

1 Outboard Motor

15 Cavitation Plate Which Constitutes Plate

16 17 Pressure sensor

18 Control Unit

19 PTT Equipment

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CLAIMS

[Claim(s)]

[Claim 1] the differential pressure given to the pressure sensor and these pressure sensor of the pair by which the relative configuration was carried out to the plate top-face [which extends in the direction of bottom horizontal discharge of an outboard motor], and inferior-surface-of-tongue side -- being based -- the posture of an outboard motor -- the attitude-control equipment of the outboard motor characterized by to have the control unit which has the function which outputs an PTT equipment active signal based on the function detect a variation rate, and the detection result concerned.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the attitude control equipment of an outboard motor, and relates to the attitude control equipment which makes adjustable the angle of trim of an outboard motor, and a tilt angle in more detail.

[0002]

[Description of the Prior Art] Generally, in order to aim at the rate engine performance and improvement in fuel consumption in a small vessel, controlling the angle of trim of an outboard motor etc. is performed.

[0003] There is much what performs predetermined switch actuation so that control of said angle of trim etc. may be performed by making the power trim tilt equipment (PTT equipment) equipped between the clamp bracket of an outboard motor, and the swivel bracket drive and a pilot may make the motor of PTT equipment drive with hand control.

[0004]

[A technical problem to solve invention] Although the attitude control of the outboard motor by said PTT equipment obtains actuation that a predetermined angle of trim should be maintained by manual switch actuation of a pilot and may demonstrate the rate engine performance of a vessel by this to the maximum extent Said switch actuation having un-arranged [of also inviting about / the engine performance which angle-of-trim control becomes various by a pilot's situation, as a result is expected not being demonstrated effectively /, and a fuel consumption rise], since it was dependent on a pilot's experiential intuition.

[0005]

[Objects of the Invention] the posture of the outboard motor [this invention took the example inconvenient / said conventional example /, was made, and / purpose / that] at the time of promotion of a vessel -- a variation rate can be detected serially and it is in offering the attitude control equipment of an outboard motor with possible making a predetermined location carry out the variation rate of the posture of an outboard motor automatically based on this detection result.

[0006]

[Means for Solving the Problem] the differential pressure given to the pressure sensor and these pressure sensor of the pair by which a relative configuration was carried out to a plate top-face [where the attitude-control equipment of the outboard motor concerning this invention extends in the direction of bottom horizontal discharge of an outboard motor in order to attain said purpose], and inferior-surface-of-tongue side -- being based -- the posture of an outboard motor - - it has the composition equipped with the control unit which has the function which outputs an PTT equipment active signal based on the function detect a variation rate, and the detection result concerned.

[0007]

[Function] Although the water pressure given to each pressure sensor is equal while the vessel is promoting in the condition that an outboard motor is in an abbreviation vertical position since said plate has extended horizontally, at the time of acceleration or moderation, said plate also inclines corresponding to the whole vessel inclining to the water surface. Since the water pressure applied to each pressure sensor at the time of this inclination changes relatively, according to this change, a control unit will output an PTT active signal so that the detection pressure of each pressure sensor may become equal.

[0008]

[Example] Hereafter, one example of this invention is explained based on a drawing.

[0009] The whole outboard motor 1 configuration is shown in drawing 1. In this drawing, the outboard motor 1 is constituted including the lower unit 5 supported for said screw 3, enabling free rotation while being prepared in the lower part of the up unit 2 which holds the engine which is not illustrated, the case 4 where the driving shaft which transmits the driving force of said engine to a screw 3 is held, and this case 4.

[0010] Through the clamp bracket 7, by using as the rotation supporting point the support shaft 9 which connection immobilization was carried out and was prepared in the upper limit of this clamp bracket 7 at the stern 8, a swivel bracket 10 is connected free [rotation], and said outboard motor 1 is formed so that revolution may become horizontally possible about an outboard motor 1 through the pilot pin which the steering bracket 11 connected at said unit 2 side does not illustrate to this swivel bracket 10. Moreover, the known PTT equipment which is not illustrated is formed between said clamp brackets 7 and swivel brackets 10, and, thereby, the angle of trim of an outboard motor 1 and tilt angle control are performed.

[0011] The cavitation plate 15 which is a plate which turns horizontally and makes the shape of a flange is formed in the peripheral face of said lower unit 5. In addition, although comparatively shown in thickness after [expedient] explaining in the state of illustration, in the system, it is prepared in closing in. The relative configuration of the pressure sensors 16 and 17 is carried out, and angle-of-trim control is performed in a top-face [of this cavitation plate 15], and inferior-surface-of-tongue side by the differential pressure given to these pressure sensors 16 and 17.

[0012] namely, -- the configuration to which prepares a bridge circuit as shown in drawing 2, and a fixed electrical potential difference is applied -- carrying out -- the electrical-potential-difference difference between A and B -- catching -- the posture of an outboard motor 1 -- a control unit 18 detects a variation rate and it has composition which outputs an active signal to the PTT equipment 19 of the next step based on this detection result. Attitude control of an outboard motor 1 is performed by the detection value which the output from a tachometer 20 and the throttle opening measuring instrument 21 is inputted into a control unit 18, and is given from these instruments 20 and 21.

[0013] Next, also with reference to drawing 3 and 4, it explains about an operation of this example.

[0014] Although the electrical-potential-difference difference in A and the B car point which are shown in drawing 2 is fixed since the cavitation plate 15 is maintained horizontally when an outboard motor 1 is in an abbreviation perpendicular condition, as shown in drawing 1 If an outboard motor 1 inclines so that the front end side of the cavitation plate 15 may displace below as shown in drawing 3, the pressure applied to the pressure sensor 16 formed in the top-face side of the cavitation plate 15 concerned will face the pressure sensor 17 by the side of an inferior surface of tongue, and will become high. At this time, change is produced to said electrical-potential-difference difference, this is detected, and a control unit 18 outputs an PTT active signal.

[0015] On the other hand, as shown in drawing 4, when the cavitation plate 15 inclines toward an opposite direction, this pressure applied to the pressure sensor 17 by the side of an inferior surface of tongue becomes high relatively, and an PTT active signal will be outputted from a control unit 18 like the above-mentioned with the above-mentioned.

[0016] When said PTT active signal is given to PTT equipment 19, the piston rod which the motor which constitutes some of PTT equipments 19 concerned, and which is not illustrated drove, and the trim cylinder and the tilt cylinder drove, and was formed possible [an attitude] within the cylinder concerned will carry out the predetermined variation rate of the swivel bracket 10, and the attitude control of an outboard motor 1 will be made by this.

[0017] Therefore, according to said configuration of this invention, pressure sensors 16 and 17 are used. A trim angular displacement is caught by detecting water pressure change which joins each [these] sensors 16 and 17. Since it is considered as the configuration which makes PTT equipment 19 drive automatically corresponding to this Like the former, it is not dependent on a pilot's intuition, can attain always maintaining an outboard motor 1 into a stable posture, and is effective in the ability to also realize fuel consumption saving as demonstrating the engine performance expected efficiently and ****.

[0018] Moreover, since said angle-of-trim displacement detection also used the installation part of this as the cavitation plate 15 in the existing outboard motor in addition to the ability to use the known pressure sensors 16 and 17, it is effective in the ability to apply without bringing a big design change conventionally to structure.

[0019] In addition, in said example, although pressure sensors 16 and 17 were illustrated and explained about the example of a configuration exposed and installed in a top-face [of the cavitation plate 15], and inferior-surface-of-tongue side, this invention is not limited to this. For example, as shown in drawing 5, while laying pressure sensors 16

and 17 under the vertical relative position in the cavitation plate 15, you may be the configuration which formed the holes 23 and 24 which lead to these pressure sensors 16 and 17, and enabled water pressure detection.

[0020] According to such a configuration, in addition to the effectiveness in said example, it becomes avoidable [direct contact with an underwater obstruction], and acquiring the advantage that pressure sensors 16 and 17 can be effectively protected from damage is expected.

[0021] moreover -- said example -- an electrical-potential-difference difference -- the posture of an outboard motor -- although a variation rate shall be detected, while incorporating a pressure value, for example from pressure sensors 16 and 17 continuously to a control unit 18, constituting so that PTT equipment may be operated is also possible, and according to this, the effectiveness that simplification of circuit structure is realizable can be acquired until the control unit 18 concerned compares both the pressure value, it searches for a difference and this difference becomes zero.

[0022] Furthermore, the installation part of pressure sensors 16 and 17 can also be set up on plates other than cavitation plate 15.

[0023]

[Effect of the Invention] the posture of the outboard motor [configuration / which used the conventional structure of an outboard motor according to this since this invention was constituted as mentioned above and acted / simple] at the time of promotion of a vessel -- a variation rate can detect serially and the attitude-control equipment of the outboard motor which does so the outstanding effectiveness it is ineffective to the former of the ability to be able to make a predetermined location carry out the variation rate of the posture of an outboard motor automatically based on this detection result can offer.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the attitude control equipment of an outboard motor, and relates to the attitude control equipment which makes adjustable the angle of trim of an outboard motor, and a tilt angle in more detail.

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PRIOR ART

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[0003] There is much what performs predetermined switch actuation so that control of said angle of trim etc. may be performed by making the power trim tilt equipment (PTT equipment) equipped between the clamp bracket of an outboard motor, and the swivel bracket drive and a pilot may make the motor of PTT equipment drive with hand control.

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

[A technical problem to solve invention] Although the attitude control of the outboard motor by said PTT equipment obtains actuation that a predetermined angle of trim should be maintained by manual switch actuation of a pilot and the rate engine performance of a vessel may be demonstrated by this to the maximum extent, Said switch actuation having un-arranged [of also inviting about / the engine performance which angle-of-trim control becomes various by a pilot's situation, as a result is expected not being demonstrated effectively /, and a fuel consumption rise], since it was dependent on a pilot's experiential intuition.

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MEANS

[Means for Solving the Problem] the differential pressure given to the pressure sensor and these pressure sensor of the pair by which a relative configuration was carried out to a plate top-face [where the attitude-control equipment of the outboard motor concerning this invention extends in the direction of bottom horizontal discharge of an outboard motor in order to attain said purpose], and inferior-surface-of-tongue side -- being based -- the posture of an outboard motor - - it has the composition equipped with the control unit which has the function which outputs an PTT equipment active signal based on the function detect a variation rate, and the detection result concerned.

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OPERATION

[Function] Although the water pressure given to each pressure sensor is equal while the vessel is promoting in the condition that an outboard motor is in an abbreviation vertical position since said plate has extended horizontally, at the time of acceleration or moderation, said plate also inclines corresponding to the whole vessel inclining to the water surface. Since the water pressure applied to each pressure sensor at the time of this inclination changes relatively, according to this change, a control unit will output an PTT active signal so that the detection pressure of each pressure sensor may become equal.

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[Drawing 2] It is a circuitry Fig. in said example.

[Drawing 3]

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